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ABSTRACT

This paper reports the results of an investigation of the relationship between scores on the School and College Ability Test (SCAT), the College English Placement Test (CEPT), and grades earned in American History and Constitution (History 27 at Cerritos College, California) in order to ascertain if predictability of "successful" or "unsuccessful" achievement in History 27 would be enhanced by prior knowledge of students' placement test scores. Grade reports and placement test scores were obtained for all who had enrolled in a History 27 course in Fall 1970 and Spring 1971. Students were classified as day or evening and full- or part-time. Grade distributions were constructed for all day and evening students. Content and predictive validity between test scores and academic achievement were established. Final observations revealed that the CEPT and SCAT tests might be of limited assistance in placing future students in History 27, but that it is highly possible that tests having greater content validity may also have greater predictive validity. (Author/AL)

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A STUDY OF THE RELATIONSHIP BETWEEN SCORES ON THE SCHOOL & COLLEGE ABILITY TEST (SCAT SERIES II), THE COLLEGE ENGLISH PLACEMENT TEST (CEPT) AND ACADEMIC ACHIEVEMENT IN AMERICAN HISTORY & CONSTITUTION (HISTORY 27)

Office of
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Cerritos College
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JC 720 126

UNIVERSITY OF CALIF.
LOS ANGELES

JUN 27 1972

CLEARINGHOUSE FOR
JUNIOR COLLEGE
INFORMATION

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Introduction

At the request of the History Department the office of Institutional Research was asked to investigate the relationship between scores on the School and College Ability Test (SCAT Series II) and the College English Placement test (CEPT), and grades earned in American History and Constitution (History 27) in order to ascertain if predictability of "successful" or "unsuccessful" achievement in History 27 would be enhanced by prior knowledge of a student's placement test scores(s).

If one assumes that the placement tests have measured individual differences in some qualities or characteristics that lead to"successful" achievement in American History, than one should be able to make a predictive statement regarding the probability of "successful" or "unsuccessful" academic achievement in History 27 based on placement test score(s). That is to say, if a correlation exists between scores on placement tests and academic achievement in American History, than decisions can be made concerning a students expected future performance, as predicted from the placement test score(s).

This study attempts to answer the question, "Through the use of existing placement test scores can a decision concerning an estimate of a students academic 'success' in History 27 be improved"?

Data Analyses

General Information

In order to carryout the aforementioned objective of the study, grade reports and placement test scores (for those who had placement test scores recorded) were obtained for all who had enrolled in a History 27 course in

the Fall, 1970, and the Spring, 1971.[1] Survey and analysis of these records indicated that 3,323 students had enrolled in a History 27 course during these two semesters. Of these 3,323 students, 2,176 or 65% were classified as attending full-time (12 or more units), and 1,147 or 35% were classified as attending part-time. In addition, 1,767 or 53% were listed as day students, 649 or 20% as extended-day, and 907 or 27% day-evening combined. It was also noted that of the 1,767 students attending in the day 793 or 45% did not have recorded placement test scores.

Grade Distribution - "ALL" History 27 Students

Concerning academic achievement for "all" History 27 students, 213 or 6% of the 3,323 History 27 students had earned A's, 491 or 15% B's, 1,193 or 36% C's, 369 or 11% D's, 147 or 4% F's, 29 or 1% E's, 105 or 3% WF's, 773 or 23% WP's, and 3 or less than 1% NC's (non-credit). (See Figure 1.)

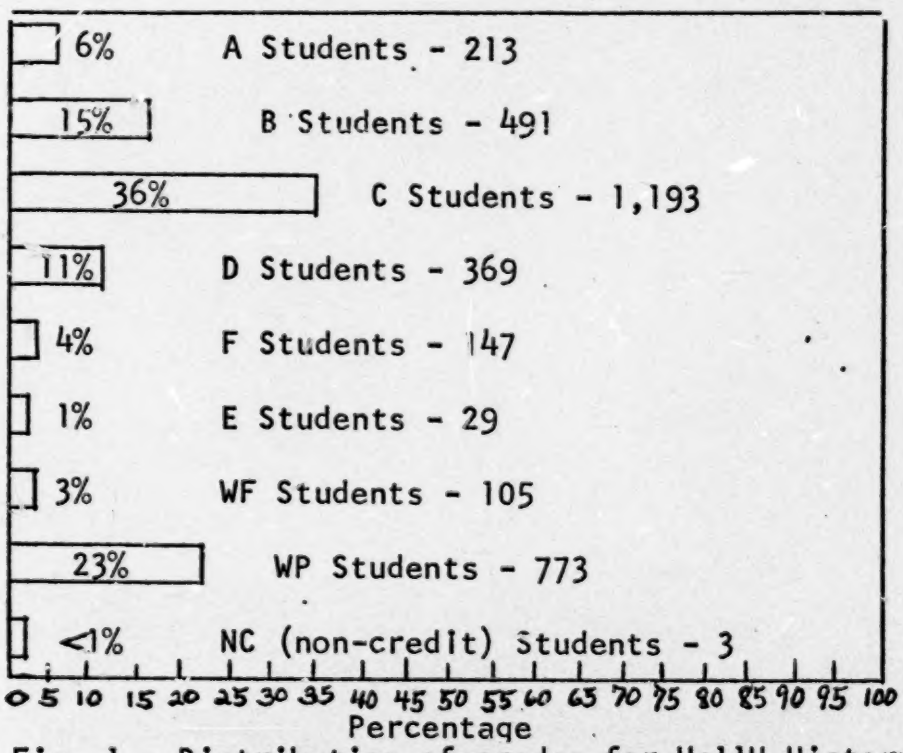
6% A Students - 213
15% B Students - 491
36% C Students - 1,193
11% D Students - 369
4% F Students - 147
1% E Students - 29
3% WF Students - 105
23% WP Students - 773
<1% NC (non-credit) Students - 3
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Percentage

Fig. 1. Distribution of grades for "all" History 27 students, Fall 1970 and Spring 1971.

Grade Distribution - "Day Students"

Pertaining to day students only, 104 or 6% had received A's, 237 or 13% B's, 682 or 39% C's, 209 or 12% D's, 97 or 5% F's, 18 or 1% E's, 40 or 2% WF's, 383 or 22% WP's, and 0 or 0% NC's (Figure 2).

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[1] These records were obtained from Data Processing.

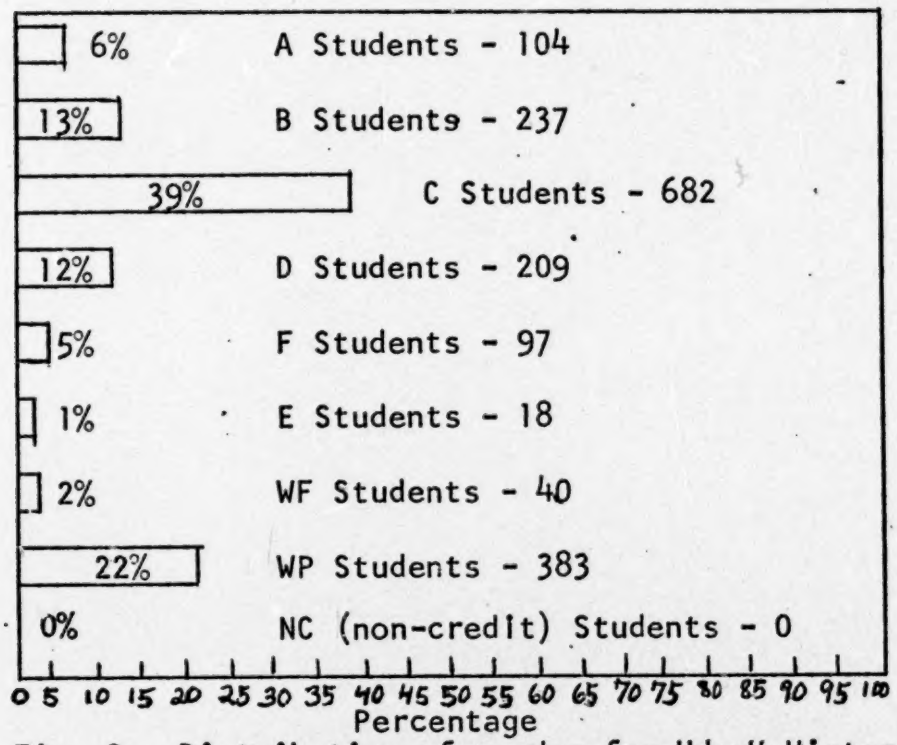


Fig. 2. Distribution of grades for "day" History 27 students, Fall 1970 and Spring 1971.

Grade Distribution - "Day Students" with recorded placement SCAT scores

In reference to day students having recorded SCAT scores,[2] 48 or 5% had earned A's, 117 or 12% B's, 404 or 41% C's, 126 or 13% D's, 58 or 6% F's, 8 or 1% E's, 11 or 2% WF's, 197 or 20% WP's, and 0 or 0% NC's (Figure 3).

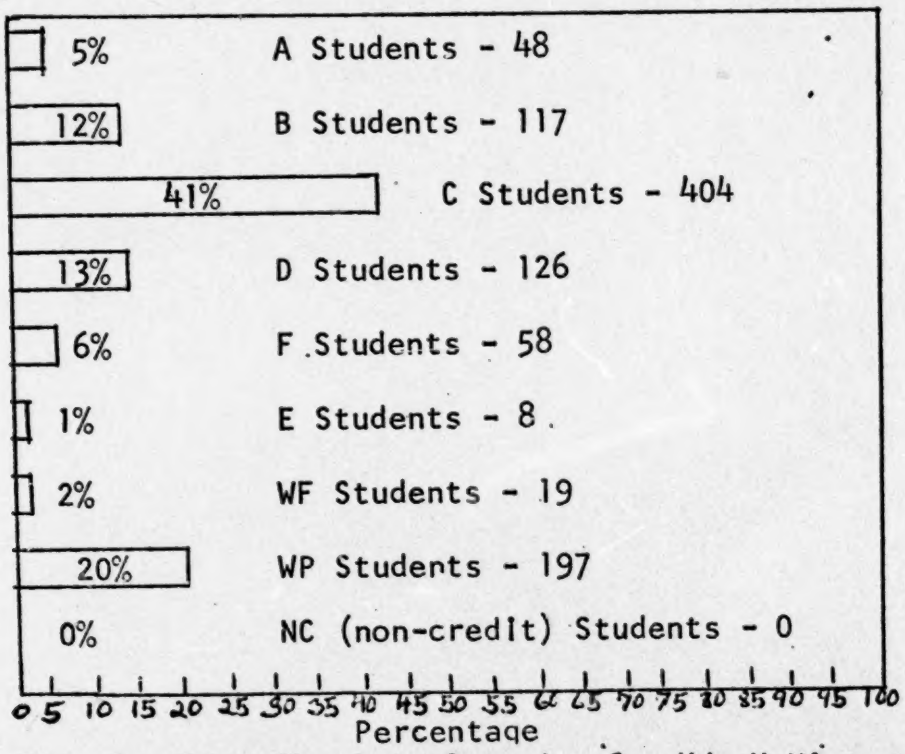
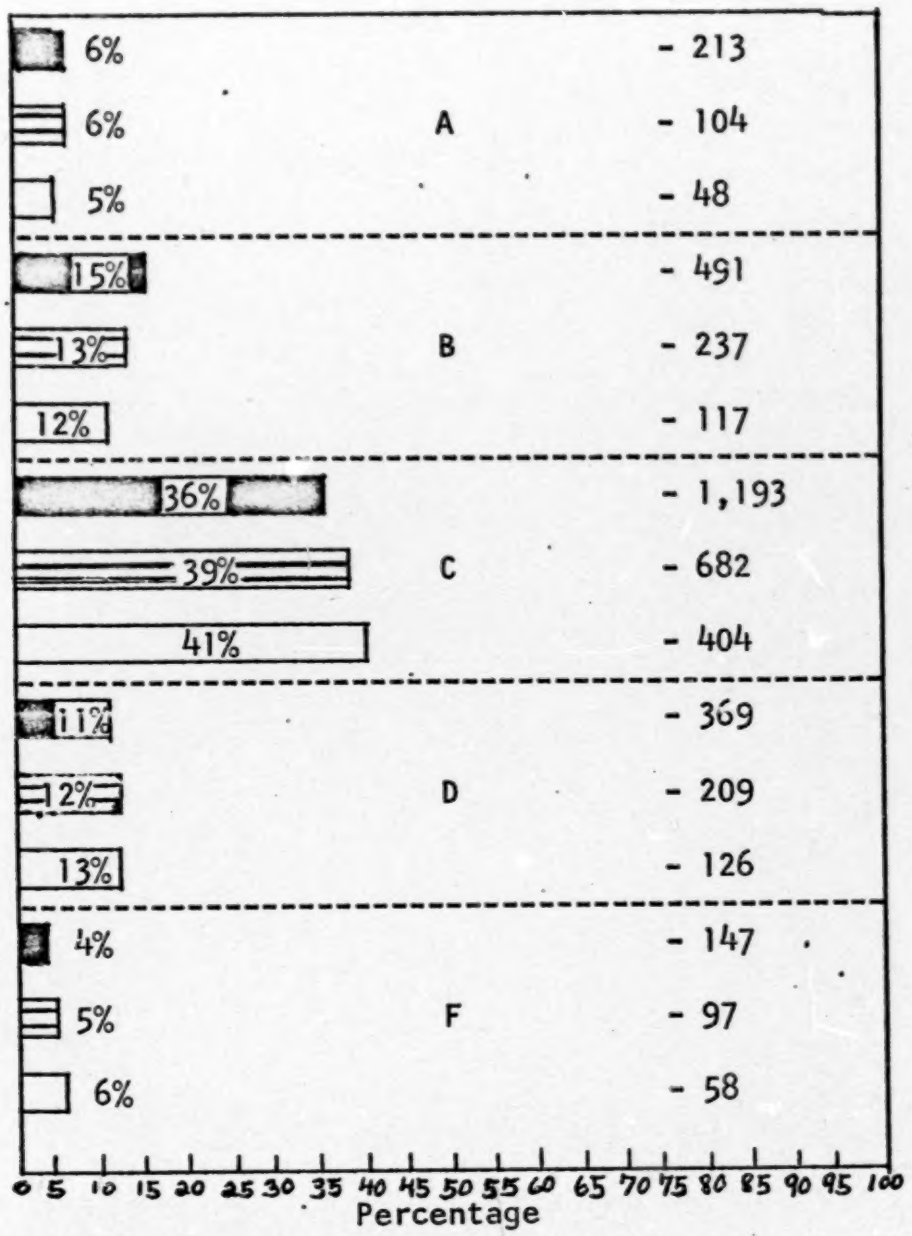


Fig. 3. Distribution of grades for "day" History 27 students with recorded placement SCAT scores, Fall 1970 and Spring 1971.

2 Prior analysis and computation of validity coefficients presented in the section entitled Predictive Validity, revealed that the SCAT-Verbal was a better predictor of academic success in History 27 than the CEPT test.

Inspection of the grade distributions across the categories of All-History-27-Students, Day-Only-Students, and Day-Only-SCAT-Verbal-Students reveals that these groups have a great deal of communality relative to grade distributions (Figure 4). Giving consideration to statistical



All students.

Day-Only-Students.

Day-Only-SCAT-Verbal-Students.

Fig. 4. Distribution of grades for All, Day-Only, Day-Only-SCAT-Verbal History 27 students, Fall 1970 and Spring 1971.

analyses, one may assume that the grade distribution of those students listed as Day-Only and having a recorded SCAT-Verbal score, provide a representative sample of History 27 students. Therefore, for the purposes of the present study, subsequent data analyses will be based on data provided by the Day-Only-SCAT-Verbal sample of American History students.

Test Validity and Decision Making or Counseling Information

The next step in the data analyses was aimed at converting the data on hand into useful decision making or counseling information. In general, the following question was given primary consideration: "How valid are the existing placement tests for predicting "successful" or "unsuccessful" achievement in History 27. 'Successful' achievement for the purposes of this study was operationally defined as having earned a grade of A, B, or C,"unsuccessful" achievement as having received a D or F grade.

The above question relating to test validity concerns the degree to which the test actually measures what we are trying to measure through its use, which in this particular case is academic achievement in American History. For the present purposes consideration was given to what psychometricians call "content validity" and "predictive" validity.

Content Validity

Content validity involves the examination of the test content to determine whether it covers a representative sample of the bahavior to be measured. Although the empirical determination of the content validity of an achievement test provides an adequate technique for evaluating what such tests measure, content validity is not considered a sufficient means for evaluating what an aptitude test measures. That is to say, aptitude tests have a lesser amount of intrinsic resemblance to the behavior variables they are trying to sample.

The following is a brief summary concerning the "content" of the SCAT and CEPT placement tests. The verbal section of the SCAT test was designed to provide estimates of "basic verbal ability". In addition, since verbal ability is a necessary requisite for successful completion of a number of school and college endeavors, the SCAT test is also purported to measure "...a students ability to succeed in future academic work". The Verbal Section of the SCAT is composed of 50 verbal analogy items. Ones score being based upon the number of correct responses to these 50 verbal analogy items in 20 minutes (a sample item is included on page 1 of the Appendix).

The CEPT test was designed to measure developed abilities in writing and language usage. Part One of the CEPT is composed of 106 objective items with a time limit of 45 minutes. In Part Two the testee is given 25 minutes to complete an essay on one of two given "propositions".

Thus, with reference to the content validity of the SCAT and CEPT placement tests, and assuming that general verbal ability along with specific skills in writing and language usage are behavioral characteristics or qualities that are related to successful academic achievement in American History, than these tests do have a measure of content validity. However, one should keep in mind that in our society general verbal ability is for the most part synonomous with "intelligence". Therefore, the qualities measured by the SCAT and CEPT tests should be related to academic achievement regardless of the course content, assuming that the more intelligent student will reap greater degrees of academic success. Relative to content validity one might ask the question, "Will successful completion of American History equip a student with the abilities necessary for him to raise his SCAT-Verbal score?"

Predictive Validity

As stated earlier, predictive validity is concerned with how well the test measures what we want it to in practical situations. A measure of

predictive validity attempts to answer this question by indicating how closely the test correlates with some criterion, which in this particular case is academic achievement in American History. An indication of predictive validity is gained through a validity coefficient, a coefficient of correlation[3] between the test and the criterion in question.

Validity Coefficients

Correlational analyses between SCAT-Verbal test scores and the criterion of "successful" v.s. "unsuccessful" academic achievement in History 27 was carried out for day-students, Fall 1970 and Spring 1971. These two correlational analyses yielded validity coefficients of +0.30 and +0.28 respectively. In addition, the same analysis for the CEPT test (Fall, 1970) yielded a validity coefficient of +0.26.[4]

Concerning the question of "What is an acceptable validity coefficient?", J. P. Guilford states, "Common experience shows that the validity coefficient for a single test may be expected within the range from .00 to .60, with most of them in the lower half of that range."[5] In addition, Cronbach states that validity coefficients as low as 0.30 are of definite practical value. He goes on to say:

> "...that the test critic who is contemptuous of low positive correlations is quite willing to accept information of no greater dependability when he plays golf or employs a physician. The correlation of golf scores between the first and second 18 holes in championship play is about 0.30, and the reliability of medical diagnosis is near 0.40...analyses show that tests with validities in the range from 0.30 to

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[3] A numerical value that describes the degree of relationship between two variables. The coefficient may take any numerical value between 0.00 (no relationship) and +1.00 or -1.00 (each indicating a perfect relationship). A positive coefficient indicates that high standing on the test goes with high standing on the criterion. The larger the correlation the more accurate the prediction.

[4] All coefficients were significant beyond the .001 level. Descriptive and computational information may be found on page 301-305 of Guilford, J. P.

[5] Guilford, J. P., page 146.

0.50 make a considerable contribution to the efficiency of an institution, though they forecast wrongly for many individuals."[6]

Graphic Representation of the Relationship Between the SCAT-Verbal Test and Academic Achievement

In an attempt to better convey the relationship between the SCAT-Verbal test and academic achievement in American History a bar diagram showing for each level of SCAT test score, the percentage of History 27 students who achieved "successful" or "unsuccessful" grades is presented in Figure 5.

In reference to Figure 5, consider the prediction of "successful achievement" in History 27 from a known score on the SCAT-Verbal placement test. For individuals having a particular score on the SCAT-Verbal test, the best estimate concerning probability of success is the percentage associated with "successful achievement" in that column. For instance, any person receiving a score of 41 on the SCAT-Verbal test will most probably (the best estimate) earn a grade in History 27 that we have defined as "successful" achievement (percentage of "success" for that column is 100%). On the other hand, one would have to predict that a person receiving a score of 16 on the SCAT-Verbal has about a 0.40 probability of receiving a grade defined as "successful" achievement (percentage of "success" for that column is 40%). Furthermore, if one did not know a students SCAT-Verbal score the best estimate of academic achievement would be a 75% chance of "success" and a 25% chance of "unsuccess". This prediction is based on the fact that for "all" the History 27 students (Fall 1970 and Spring 1971) that received a grade of A, B, C, D, or F, 75% were "successful" and 25% were "unsuccessful".

Again in reference to Figure 5, it will be noticed that there is a general upward trend in the probability of "success" as one goes from low to high scores on the SCAT-Verbal test, though there are a few inversions. However, for the most part, the percentages associated with these inversions are based upon a small number of cases and thus are less reliable estimates.

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6 Cronbach, L. J., page 429.

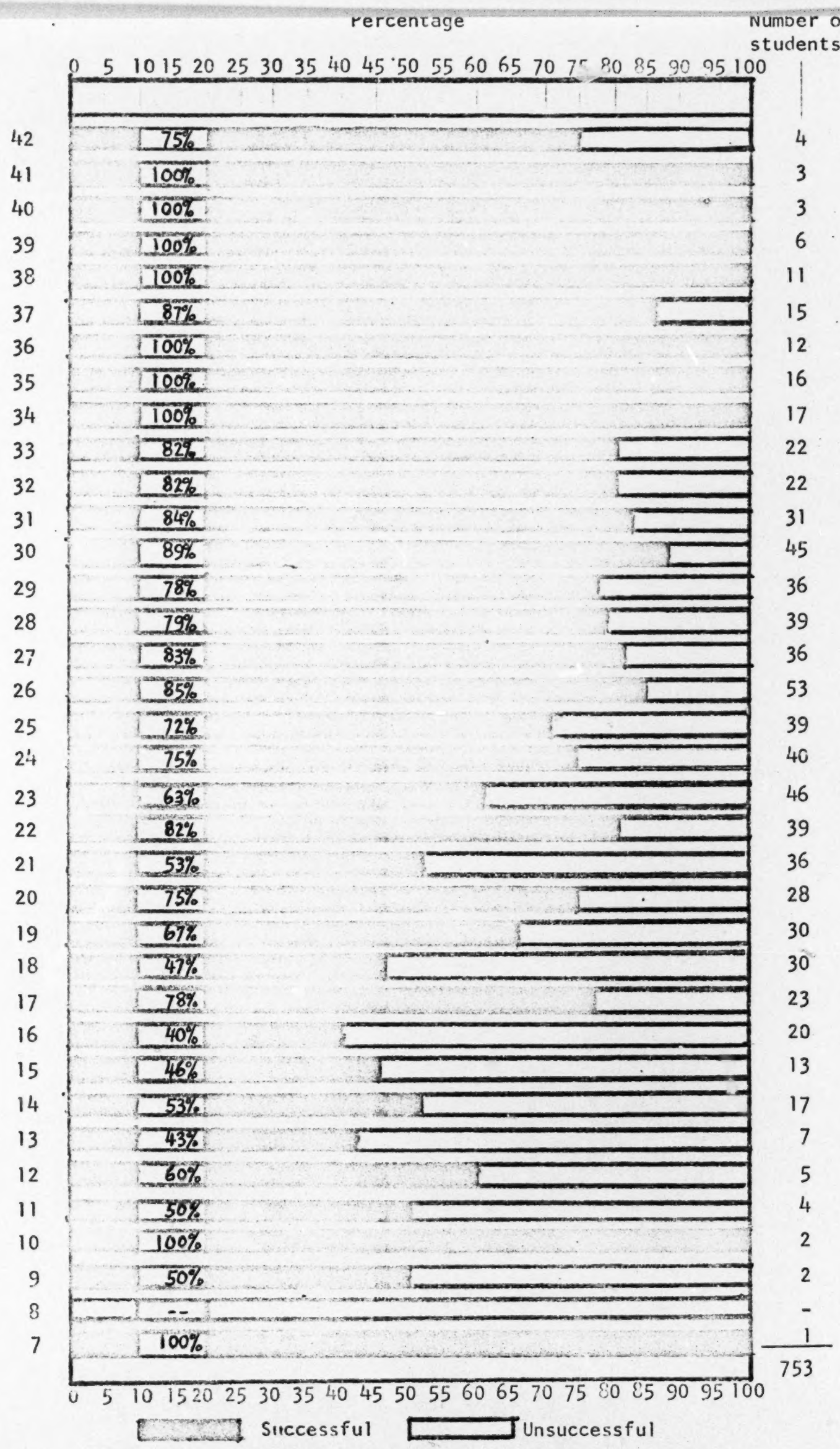

Fig. 5. Correlation between SCAT-Verbal score and the criterion of successful-unsuccessful achievement in History 27 illustrated by a bar diagram.

Selection of "Cutoff" Score

Cutoff scores are usually determined from an expectancy table or a diagram similar to Figure 5. Selection of a cutoff score requires a value judgment on the part of a decision maker. The choice of a cutoff score cannot be made purely on an empirical basis. It is usually based on personal, social, and economic values, combined with practical considerations.

Relative to the data on hand, if one were to select a SCAT-Verbal score of 25 as the cutoff point than he would note that: (1) for those students with scores of 26 and above, 86% were "successful" and 14% were "unsuccessful"; (2) for those with scores of 25 and below 64% were "successful" and 36% were "unsuccessful"; and (3) that those students with SCAT scores of 25 and below comprise 51% of the sample of students. Page 2 of the Appendix presents this data in a contingency table along with Chi-Square and Coefficient of Contingency statistics.

If one were to select a SCAT-Verbal score of 20 as the cutoff point than he would note that: (1) for those students with scores of 21 and above, 80% were "successful" and 20% were "unsuccessful"; (2) for those with scores of 20 and below, 59% were "successful" and 41% were "unsuccessful"; and (3) that those students with SCAT scores of 20 and below comprise 24% of the sample of students. Page 2 of the Appendix presents this data in a contingency table along with Chi-Square and Coefficient of Contingency statistics.

Conclusions and Recommendations

1. Based on the grade distribution covering grades of A through F for "all" American History students (Fall 1970 and Spring 1971) only, the best estimate of any given students expected future performance would be that he had a 75% chance of "success" and a 25% chance of "unsuccess".

2. Based on the knowledge of a students SCAT-Verbal score one could make a more specific or discriminant estimate of a students expected future academic performance in History 27.

3. Correlational analysis revealed a low but definite positive correlation (validity coefficient) between SCAT-Verbal scores and academic achievement in American History. That is to say, there is a general upward trend in the probability of "success" as one goes from low to high scores on the SCAT-Verbal test.

4. It appears that about 25% of the students who take the SCAT-Verbal test at Cerritos College attain a score of 20 and below. In addition, the data showed that of the students who had scores of 20 and below, 59% were "successful" and 41% were "unsuccessful". On the other hand, of those that had scores of 21 and above, 80% were "successful" and 20% were "unsuccessful". Thus the data suggests that if the SCAT-Verbal test was used for placement purposes in History 27 the adoption of a cutoff score of 20 would arbitrarily classify approximately 1 out of every 4 students tested as potential "unsuccessful" academic achievers" in History 27. Of these students so identified each would have less than a 60/40 estimated chance of academic "success" in History 27. It is apparent that a 60/40 probability of academic success leaves a lot of room for improvement. How and <u>if</u> an improvement in the probability of success can be realized is another question.

5. Concerning the prediction of academic success in History 27 it is highly possible that tests having greater content validity may also have greater predictive validity.

The Sequential Test of Educational Progress: Social Students (STEP) might fall in this category. This test is purported to measure a student's ability to apply school-learned skills to the solution of new problems. A test reviewer has stated, "The STEP tests in social studies continue without peer, indeed almost without available counterparts, as the leading standardized series of skill tests in social studies." Thus it appears the use of this test as a predictor of academic success warrants further research.

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APPENDIX

A sample item from the SCAT-Verbal Section, Series II of the School And College Ability Test.

Each question begins with two words. These two words go together in a certain way. Under them, there are four other pairs of words lettered A, B, C, and D.

Find the lettered pair of words that go together in the same way as the first pair of words.

Then, find the row of boxes on your answer sheet which has the same number as the question. In this row of boxes, mark the letter of the pair of words you have chosen.

See how this example is marked:

EXAMPLE calf: cow:: A B C D

A puppy : dog
B nest : bird
C horse : bull
D shell : turtle Answer

In the first pair of words (calf : cow), calf goes with cow in this way--a calf is a young cow.

The only lettered pair of words that go together in the same way is puppy : dog. A puppy is a young dog.

Box A is marked because the letter in front of puppy: dog is A.

Chi-Square and Coefficient of Contingency

The Chi-Square test is used to determine if the observed differences between frequencies in each category ("successful" vs "unsuccessful") are likely to have occurred by chance.

The Coefficient of Contingency relates to the question, "Is there any correlation between scores above and below the cutoff point and academic achievement in American History.

Table 1. A comparison of "successful" vs "unsuccessful" academic achievement in History 27 with respect to a SCAT-Verbal cutoff score of 25.

SCAT Scores	Success	Unsuccess	Both
≥26.....	320	51	371
≤25.....	246	136	382
Total.....	566	187	753

Chi-Square = 46.99, which is significant beyond the .001 level.
Coefficient of Contingency = .25

Table 2. A comparison of "successful" vs "unsuccessful" academic achievement in History 27 with respect to a SCAT-Verbal cutoff score of 20.

SCAT Scores	Success	Unsuccess	Both
≥21.....	458	113	571
≤20.....	108	74	182
Total.....	566	187	753

Chi-Square = 31.09, which is significant beyond the .001 level.
Coefficient of Contingency = .20